Motion control algorithms for mobile vehicles and marine crafts

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STELLINGEN
behorende bij het proefschrift

Motion Control Algorithms for Mobile Vehicles and Marine Crafts

van Iurii Kapitaniuk

1. Most commercial motion control solutions are blackbox systems, in the sense that they implement specific functionality which cannot be altered. In many cases, one can just ignore their presence; however, to get the best results, one has to include the corresponding dynamics into the design procedure. (Chapter 2 & 6)

2. It is not enough to assume only stability of the dynamical system generating the guiding vector field for path-following. (Chapter 2 & 3)

3. Due to the presence of degeneracy points in the vector field, it is in general impossible to prove global convergence to the desired trajectory. However, it is possible to explicitly estimate a region of initial conditions for which such convergence can be established. (Chapter 3)

4. Using an appropriate change of variables, the moving path following problem can be transformed to the standard "static" case with a dynamic scale factor that changes the angular speed. (Chapter 4)

5. A viable alternative to the practice of embedding an accurate model of irregular waves into the roll damping controller is to consider a few "dominating" frequencies corresponding to the peaks of the spectral density. (Chapter 6)

6. *"Now, the all-important point is this in control theory it is immaterial what physical object is represented by the dynamical system under consideration, what matters is the mathematical structure of the plant (this is the reason that control theory is* not *subdivided according to whether the plant is a spacecraft, aircraft, or seacraft). So the problems are strictly mathematical."* (R. Kalman, *Topics in Mathematical System Theory*).

   There is not much difference between an airplane and a marine craft if you are ready to sacrifice some details. (Chapter 5)

7. *"There should be one – and preferably only one – obvious way to do it. Although that way may not be obvious at first unless you're Dutch."* (The Zen of Python)

   The concept of optimal universal controllers and non-unique representation of reference trajectories within the GVF framework drive me further away from understanding Dutch people.